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CURRICULUM GUIDE

ELECTRICITY 10 - 21 - 20 - 30

(Interim Edition)
September, 1954

Province of Alberta

Department of Education

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COURSE CREDIT VALUES

ELECTRICITY 10 - 4 or 5 credits

ELECTRICITY 20 - 8 or 10 credits

ELECTRICITY 30 - 10 or 15 credits

ELECTRICITY 21 - 4 or 5 credits

FOREWORD

In view of its multitude of applications in our modern world, a sound working knowledge of electricity will prove of great value to the majority of students.

The tremendous increase in general interest in the field of electronics has made it inevitable that the study of radio should no longer be postponed and reserved for third year students only, but instead, become a topic spread over the three years. The work of the first year in radio should emphasize the practical shop work of building or assembling a small set, and the detection and correction of minor troubles in personal sets and equipment. The instructor should not be too concerned about the first year students' general lack of knowledge of alternating current fundamentals. The introductory theory should be kept on a very broad and somewhat elementary basis, suited to the requirements of the entire class.

As many demonstration experiments as possible should be performed, using actual equipment rather than word description of devices.

The related theory topics comprise a few fundamentals with several typical applications. A selection of as many as possible of these basic principles should be made with the applications dependent upon interests of students, frequency of occurrence in their day-to-day experiences and time limitations.

Safety factors relevant to the handling of electrical apparatus should be stressed.

GENERAL INFORMATION

1. COURSE ORGANIZATION:

It is recommended that in all electricity courses the available time be apportioned approximately as follows:

Shop Practice - - - - -	40%
Theory - - - - - - - - -	40%
Drafting - - - - - - - -	20%

2. SAFETY PROGRAM:

Every shop must have an effective safety program. In the electrical shop particular emphasis must be given to safe operation of equipment in the use of power.

A good safety program features the following devices: regular, consistent and thorough instruction; constant vigilance and checking by instructor; safety posters; student safety committee; adequate first-aid equipment; instructor trained and up-to-date in first-aid methods; dynamic color painting of machines and equipment; adequate working space about machines; safety lines on floor around machines; routine reports on accidents, however minor; machines and tools in approved working condition; a safety-conscious group of students and instructor.

3. INSTRUCTOR'S RECORDS:

The instructor should keep accurate records of:

student enrolment and attendance
student accounts
student project activity
theory covered
tests given
student achievement

4. STUDENT RECORDS:

Instructors will ensure that the student develops and maintains a neat and accurate record of:

notes on theory
daily shop activities
project plans and records

5. GUIDANCE AND VOCATIONAL INFORMATION:

Instructors must assume responsibility in their trade area and ensure that students and school guidance officials are aware of the local situation. It is advisable that instructors be active and interested and informed.

6. ACHIEVEMENT:

The stress in our schools is QUALITY rather than QUANTITY. Instructors are responsible for ensuring that students are achieving to their capacity.

7. USE OF PROGRAM OUTLINES:

Instructors are expected to use the course outlines insofar as the shop accommodation and equipment permits. Experienced instructors may vary from this practice provided they can justify such variation to responsible officials.

ELECTRICITY 10

AN ORIENTATION COURSE

THE COURSE IN UNITS:

1. Early History and Development.
2. Units of Electrical Measurement.
3. Electrical Circuits.
4. Magnetism.
5. Electromagnetism.
6. Electromagnetic Induction.
7. Distribution and Wiring (Lighting and Power).
8. Introduction to Radio.

COURSE CREDIT VALUES:

Electricity 10 - 5 credits
Units 1, 2, 3, 4, 5 and one of 7 or 8.

Electricity 10 - 4 credits
Units 1, 2, 3, 4, 5 with some introductory treatment of either 7 or 8.

Note: Use Unit 6 for additional studies if needed.

ELECTRICITY 10

UNIT ONE: EARLY HISTORY AND DEVELOPMENT

Specific Objective

To develop the students' knowledge and appreciation of the history of electricity and the men associated with its advancement.

Suggested Studies

Early history and development: Lodestone, Thales, Gilbert, Von Guericke, Gray, Du Fay, Leyden, Franklin, Galvani, Volta, Oersted, Ampere, Ohm, Faraday, Morse, Edison, Bell, Maxwell, Tesla, Hertz, Roentgen, Marconi, Popov, J.J. Thompson, De Forest, Armstrong Conrad, Watson Watt, Bardeen and Brattain.

The atomic theory of matter.

General nature and forms of electricity (static, current, magnetism, radiation).

Current flow theory: conventional; electron; hole conduction in "p" type Germanium.

Conductors and insulators.

Kinds of current electricity: AC; DC; pulsating, graphs, water analogy, sources, uses.

Methods of generating electricity and applications: friction; chemical; electromagnetic induction; electrostatic induction; heat; light and piezoelectric.

Suggested Projects and Activities

1. Tour of the Electrical Shop.
2. Emphasis of general shop organization and the responsibilities of the individual.
3. General safety precautions.

4. Introduction to hand and other tools, apparatus and equipment of the shop. Their use and care.

5. Splicing, soldering, sweating and taping of an accepted set of the various standard splices and joints.

UNIT TWO: UNITS OF ELECTRICAL MEASUREMENT

Specific Objective

To develop the students' knowledge and appreciation of various instruments; their care and methods of connecting meters in circuits.

Suggested Studies

The coulomb, ampere, volt, ohm, watt and watthour with prefixe micro-, milli-, kilo-, and meg-.

Introduction to the ammeter, voltmeter, and ohmmeter with particular attention to purposes and proper connection in the circuit.

Relationships: Ohm's Law; Power and energy.

Factors governing resistance: cross section, length, temperature, material. Carrying capacity.

Wire table and conductor sizes.

Circular mil and mil-foot. Below is stated a sufficiently accurate method of estimating changes in characteristics caused by changes in size:

> cross section, resistance and weight are doubled (or halved) for every three sizes; they are multiplied (or divided) by 10 for every ten sizes.

Suggested Projects and Activities

1. Using ammeters protected by a fuse.
2. Watthour meters.
3. Individual or group demonstrations of the application of Ohm's Law to series and parallel circuits wired upon work boards.

UNIT THREE: ELECTRICAL CIRCUITS

Specific Objective

To develop the students' ability to make and read electrical drawings and electrical symbols.

Suggested Studies

Series, Parallel and Series Parallel. Problems to show application of Ohm's Law.

Simple troubles and their location: grounds, open circuits, short circuits. Applications.

Circuit sketching for extra low potential circuits (under 30 volts) and for low potential circuits (30-750 volts). Stress symbols concerned.

Suggested Projects and Activities

Note: Much material in this unit is suitable for formal drafting lessons.

1. Application of wiring diagrams.
2. Connection of dry cells and storage batteries in series and parallel layout.

3. Connection and operation of bell and buzzer circuits such as:

    Bells or buzzers in series.
    Bells or buzzers in parallel.
    Return call three-wire systems.
    Return call two-wire systems.
    Day and night bell and buzzer systems.
    Annunciator systems.
    Apartment house circuits.

4. Lighting circuits such as:

    Lights in series, lights in parallel.
    Three-way circuit.
    Four-way switches added to three-way circuits.
    Fuses and circuit breakers.
    Diagramming of the above circuits for notebooks using the proper symbols.

At the instructor's discretion, this would be a suitable unit to introduce elementary radio theory - A.C., D.C., and pulsating current graphs, the water analogy. Sources and uses of these currents. Frequency (RF, IF, AF), wave length, cycle.

UNIT FOUR: MAGNETISM

Specific Objective

To develop the students' ability to interpret certain magnetic fields.

Suggested Studies

General characteristics of magnetism. Rowland's experiment and electron spin. Laws of Magnetism.

Polarity.

Laws of attraction and repulsion.

Earth's magnetism - declination or variation, inclination or dip.

Magnetic lines and fields of force.

Molecular theory.

Residual magnetism: Saturation, Induction, coercive force.

Permeability and reluctance.

Metals and alloys with special magnetic properties, magnetic shielding. Permanent magnets.

Suggested Projects and Activities

1. Magnetising and demagnetizing of permanent magnets.
2. Shielding, neutralizing (non-inductive winding), effects of heat, dropping and tapping.
3. Selection of magnetic and non-magnetic specimens from an assorted lot and their classification.
4. Making a permanent magnet, bar type, or a horseshoe magnet with keeper.
5. Remagnetizing magnets of a magneto.
6. Construction of small step-down transformer or some application of the transformer - electric soldering iron.

UNIT FIVE: ELECTRO-MAGNETISM

Specific Objective

To observe and understand the relationship between electrical current and magnetism.

Suggested Studies

Oersted's experiment.

The hand rule for the magnetic field around a straight conductor.

Magnetic fields about a straight conductor, close parallel wires, helix or solenoid.

The hand rule for polarity of electromagnet.

Fleming's motor rule.

Magnetic field about a four pole DC motor.

Factors governing strength of electromagnets: ampere turns, length, cross section, permeability.

Suggested Projects and Activities

1. Winding a simple electro-magnet.
2. The practical application of one or more electromagnets made by the student to a project such as a buzzer, bell, telegraph sounder, simple D.C. motor, pickup tool, solenoid, door opener, relay, door chimes, magnet charger.

   Note: Use hand rules to suit the current flow direction taught.

UNIT SIX: ELECTROMAGNETIC INDUCTION

Specific Objective

To develop the student's knowledge and appreciation of the principles involved in electromagnetic induction.

Suggested Studies

A study of Faraday's D.C. generator and its relation to present generators.

Factors governing value of e.m.f. produced: speed, flux, turns.

Fleming's hand rule for D.C. generators. Application to the D.C. generator.

Lenz's Law.

Self-induction. Mutual induction. Examples and application, (transformer, formula, car ignition system).

Suggested Projects and Activities

1. The construction of the following pieces of apparatus will allow the student to observe the principles of electromagnetic induction:

   Constructing an induction coil or step down transformer.

   Experiments with the high tension ignition coil.

UNIT SEVEN: DISTRIBUTION AND WIRING (LIGHTING AND POWER)

Specific Objective

To develop student interest in the practical application of lighting and power distribution in the home and industry.

Suggested Studies

Federal, provincial and local wiring legal requirements with particular reference to the home. T.Q.A. Permit fees, etc.

A study of service and outside wiring requirements with reference to the home. Fuses and circuit breakers. Telephone protectors.

Good planning. Computation of loads. See Tables 1, 13, 14, and 17 of Canadian Electrical Code, Part I, Sixth Edition, 1953.

Methods of Wiring. See Section 12 of Code.

Lamps - styles, types. Neon and fluorescent lamps.

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Suggested Projects and Activities

1. Practical servicing of fixtures, appliances, cords, plugs, caps, etc.
2. Removing or "skinning" of insulation.
3. Splicing, soldering, sweating and taping of an accepted set of the various standard splices and joints (if not covered in Unit I).
4. Measuring, study and selection of proper current carrying capacity of wire and cable by wire gauge numbers.
5. Servicing and installation of lamp sockets, line switches, etc.
6. The Underwriter's knot.
7. Locating and replacing "blown" fuses.
8. Use of test lamps.
9. Construction of a test lamp for locating "Blown" fuses. Practice wiring of typical household light and appliance circuits on boards, in booths or in a skeleton house; two and three wire services. "Knob and tube" wiring followed by modern examples of conduit: rigid, Loomex, BX and BXL, thin-wall, armored cable and surface runway wiring. Construction and/or practical study of simple neon and fluorescent lamp systems.

UNIT EIGHT: INTRODUCTION TO RADIO

Specific Objective

To develop an interest in an appreciation of the field of electronics.

Suggested Studies

Radio frequency waves and radiation.

Triodes, grid action, ABC supplies. Prong numbering. Transistors.

Oscillatory discharge of capacity through inductance, the water analogy.

Tuning. Oscillator, code oscillator.

Modulation: AM, FM. Phono oscillator.

Detection of AM.

Heterodyne and IF.

Signal tracing, reverse with signal generator or test oscillator.

Color code and standard sizes.

Suggested Projects and Activities

1. Dismantle tubes. Draw sections. Learn of parts, pin layout, various elements, etc.
2. Repairing dead radio: test tubes (and be sure that they are heating); signal trace to locate defective stage, measuring voltages on tube in defective stage, visual inspection, ohmmeter tests.
3. Wiring AC-DC power supply and testing with oscilliscope.

SHOP DRAFTING FOR ELECTRICITY 10

Follow the first year of shop drafting as specified in the separate bulletin Special Shop Drafting Outlines.

Plates are to be done which are concerned with electrical symbols, circuit and wiring diagrams.

ELECTRICITY 21

This is a 4 or 5-credit course for town and rural high school students who are taking their shop courses in comprehensive general shops. Such shops do not have the specialized equipment found in the unit electrical shop.

The prerequisite for this course is Electricity 10.

The instructor is to select the material from Electricity 10 which was not taught in the prerequisite course and make a selection from Electricity 20 in accordance with the shop equipment available.

This course may be offered only on special approval of the Department of Education.

ELECTRICITY 20

A VOCATIONAL ELECTRICAL COURSE

THE COURSE IN UNITS:

1. Ionization.
2. The DC Generator.
3. The Direct Current Motor.
4. Introduction to AC fundamentals.
5. Transformers.
6. Single Phase AC Motors.
7. Instruments and Measurements.
8. Communications.
9. Radio.
10. Television (Theory).

COURSE CREDIT VALUES:

Electricity 20 - 8 or 10 credits
Unit 10 to be considered optional.

ELECTRICITY 20

UNIT ONE: IONIZATION

Specific Objective

To familiarize the student with the theory of ionization and its application to electrical processes and equipment.

Suggested Studies

Excitation.

Ionization.

Radiation.

Application to liquids: primary and secondary cells; electroplating; electrolysis with emphasis on storage battery.

Application to gases: gas tube lighting; gas filled rectifiers; thyratons; ignitrons, etc.

Suggested Projects and Activities

1. Primary cells:

   Establishing polarity and measuring the voltages for a number of pairs of elements in various electrolytes.

   Construction of a practical primary cell.

   Electroplating of an object.

2. Secondary cells and batteries:

   Experimental lead-acid cell formed from lead strips.

   Measurement of its polarity, voltage and current flow.

   Dis-assembley or assembly of part, or all of a 6-volt automobile style storage battery from manufactured plates.

Charging and discharge methods and rates.

Testing: hydrometer, voltmeter, high rate discharge.

Battery care replenishing of distilled water, removal of corrosion, etc.

3. Connect a thyraton timer.

UNIT TWO: THE DIRECT CURRENT GENERATOR

Specific Objective

To study and understand the principles involved and applied in a DC generator.

Suggested Studies

Factors governing voltage computation and output.

Fleming's generator rule and its applications.

Essential parts of the generator and their functions.

Types and characteristics of DC generators: shunt, series, cumulative compound, differential compound.

Selection of types for service.

Voltage control and regulation: voltage regulator, reverse current cutout, current limiter.

Simple types of armature windings: lap and wave.

Armature reaction. Brush positions and good commutation. Interpoles and amplidynes.

Losses and efficiency.

Suggested Projects and Activities

1. Connect up and graph characteristics of shunt, and compound generators.

UNIT THREE: THE DIRECT CURRENT MOTOR

Specific Objective

To study and understand the principles involved and used in DC motors.

Suggested Studies

Factors governing torque.

Fleming's motor rule and its applications.

Essential parts of the motors and their functions.

Types of DC motors: shunt, series, cumulative compound, differential compound. Selection of types for service.

Speed control and regulation.

Starting boxes.

Reversal of rotation.

Armature reaction. Brush positions and good commutation. Interpoles.

Losses and efficiency.

Rating.

Suggested Projects and Activities

1. Connect motors to starting box. Reverse.
2. Control Speed.

UNIT FOUR: INTRODUCTION TO AC FUNDAMENTALS

Specific Objective

To teach and apply the fundamentals of AC theory.

Suggested Studies

The AC cycle or sine curve for voltage and current.
RMS and max.

The power curve. Real and apparent power. Power factor.

Electrical degrees and radian measure.

Phase relations: in phase, leading, lagging, phase angles.

Suggested Projects and Activities

1. As much laboratory type of circuit study as equipment permits.

UNIT FIVE: TRANSFORMER

Specific Objective

To teach the principle, construction, wire connections and uses of transformers.

Suggested Studies

Application of electromagnetic induction to the transformer.

Essential features of construction: primary and secondary windings, core.

Transformer types.

Selection of types and ratings for service.

Cooling methods.

Losses and efficiency.

Connections: single phase 110; 110/220; 220 closed delta; 220 open delta; star, 120/208; Scott.

Suggested Projects and Activities

1. Dis-assemble commercial type transformer.
2. Connection of single phase, step down transformers 220 to 11 volts.
3. Measurement of input and output voltages.
4. Construction of a small or medium sized practical transformer such as used for 110/6, 9 or 12 volts bell-ringer, welding, electric train transformers.

UNIT SIX: SINGLE PHASE AC MOTORS (Repulsion & Induction)

Specific Objective

To study and understand the principles involved and applied in single phase AC motors.

Suggested Studies

Types: Universal; split-phase; capacitor start; repulsion-start induction-run; shaded poles; synchronous.

Control Equipment: Overload, low voltage, and no voltage protection. Refer to Canadian Electrical Code for installation regulations.

Reversal of Rotation.

Power Factor and AC Motors.

Suggested Projects and Activities

1. Observe applications of AC motor types around school plant.

2. Connect across the line starter.

3. Place single phase windings on blank stator. Test and reverse.

UNIT SEVEN: INSTRUMENTS AND MEASUREMENTS

Specific Objective

To teach the correct use of common and special instruments, and the principles involved.

Suggested Studies

Purpose, construction and connection in the circuit of the ammeter, voltmeter and wattmeter, and watthourmeter. Shunts, multipliers, rectifiers, thermocouples, instrument transformers.

Special types: galvanometer, ohmmeter, megger, bridge, vacuum tube voltmeter, oscilliscope, signal generator, tube tester, and other special meters.

Units: mass, length, time, velocity, momentum, force, work or energy, power.

Suggested Projects and Activities

1. Use of instruments in shop situations.

2. Measure a resistor by plotting volts against amps.

3. Plot power in a resistor by theory (I^2R), wattmeter, and using voltmeter and ammeter readings multiplied on slide rule.

UNIT EIGHT: COMMUNICATIONS

Specific Objective

To teach the principles involved in the various communication instruments.

Suggested Studies

Fundamentals of telephone, telegraph and teletype. Essential parts and their operation.

Exchanges: interphone, manual, automatic.

Line circuits: 2-wire, phantom, carrier, etc.

Repeater stations.

Special systems: purpose, and general principles of operation of radio, telephony, telephoto, telautograph, facsimile, etc.

Suggested Projects and Activities

1. Telephone:

   Connecting and operating two sets on a battery powered system at locations spaced as distant as shop facilities permit.

   Study of a "breadboard" set; and diagramming, using proper symbols, of the various units and connections for student's notebook.

2. Telegraph:

   Connecting and operating a two battery buzzer, and/or sounder stations complete with their respective keys.

3. Other Equipment:

   Connecting and operating other special equipment available.

UNIT NINE: RADIO (INTERMEDIATE YEAR)

Specific Objective

To continue the study of radio.

Suggested Studies

More advanced study of the principles of the vacuum tube.

Introduction to the tetrode (screen grid), and the pentode tubes.

Types and properties of coils, transformers, condensers and resistors with particular reference to application of elementary AC principles.

More advanced study of the general principles and methods of radio receiving sets.

FM detectors. Visual alignment.

Analyzing of more difficult troubles than in the first year.

Introduction of testing equipment.

Suggested Projects and Activities

1. Building of amplifier, receiver, or instrument (kits are recommended).
2. Trouble shooting and repair.
3. Align IF amplifier using sweep frequency signal generator.

UNIT TEN: TELEVISION THEORY

Specific Objective

To teach the overview and as much TV theory as is considered reasonable.

Suggested Studies

TV signal; "Pix"; synchronizing pulses; blanking; sound.

Band width requirements of RF, IF, VF.

Video amplifiers, simplifiers and peaking.

DC restorer, focus, ion trap.

Sync separation.

FM detectors.

Flyback power supply.

Automatic gain control.

Note: Only in most unusual situations will any shop practice be possible or advisable.

SHOP DRAFTING FOR ELECTRICITY 20

The scope as indicated for the second year in the Special Drafting for Shop students should be used as a guide. The stress is to be on circuit diagrams and electrical symbols.

ELECTRICITY 30

A VOCATIONAL ELECTRICITY COURSE

Recognition of High School Technical Electives in Apprenticeship Training.

Arrangements with the Provincial Apprenticeship Board have been made for the recognition of Unit Shop courses in the high schools on the following terms:

(a) A student who has successfully completed Electricity 10, 20, and 30 at an approved Unit Shop under a journeyman instructor, may sit for an examination set by the Advisory Committee of the Apprenticeship Board and if successful will be granted a one year credit of apprenticeship training, thereby allowing the student to start his second year of apprenticeship on leaving high school.

(b) A student who has successfully completed Electricity 10, 20 and 30 at an approved Unit Shop, not under a journeyman instructor but one who has considerable training and experience in the trade to the satisfaction of the Apprenticeship Board, may begin his apprenticeship training and if after three months of training on the job his work reaches a satisfactory standard he may be allowed to sit for an examination in his trade set by the Advisory Committee of the Apprenticeship Board and if successful he may then proceed to the second year of his apprenticeship training.

For further details apply to the Director, Provincial Apprenticeship Board, 4th Floor, Administration Building, Edmonton.

ELECTRICITY 30

A VOCATIONAL ELECTRICAL COURSE

THE COURSE IN UNITS:

1. Behavior of Resistance, Inductance and Capacity with Changing Currents.
2. Power Frequency Applications.
3. High Frequency Applications.

COURSE CREDIT VALUES:

Electricity 30	- 10 credits Unit 1 plus either Unit 2 or Unit 3.
Electricity 30	- 15 credits All units.

UNIT ONE: BEHAVIOR OF RESISTANCE, INDUCTANCE AND CAPACITY WITH CHANGING CURRENTS

Theory

Current in, and voltage across; resistance, inductance and capacitance with square, sawtooth and sine waveforms.

Time constant of inductive and capacitive circuits. $\frac{L}{R}$ and RC.

Mathematical relationships in series and parallel circuits containing resistance, inductance and capacitance.

Inductive and capacitive reactance and susceptance.

Frequency, phase, vectors, the operator $j=\sqrt{-1}$ or impedance triangle.

Impedance and admittance.

Resonance in series and parallel circuits, voltage gain at resonance, Q and skin effect, L/C ratio.

Power curves and power factor, kilovars, cosine of angle of lead or lag.

Energy in resistors, inductors, and capacitors.

Impedance matching, maximum power transfer, efficiency.

Shop Practices

1. Find resistance by bridge, ammeter and voltmeter, ohmmeter, megger.
2. Find inductive reactance and capacitive reactance by bridge, ammeter and voltmeter, and calculation from L, C, f.
3. Find phase angle by ammeter, voltmeter, and wattmeter, power factor meter, electronic switch or Lissajous figures, and calculation from L, C, f, for lead and lag.

4. Find impedance by ammeter and voltmeter, bridge, and calculation from R, L, C, f.

5. Find resonant frequency by signal generator and oscilloscope, grid dip meter, and calculation from L, C.

UNIT TWO: POWER FREQUENCY APPLICATIONS

Theory

Alternators, single, two and three phase, exciters, voltage regulators, phase sequence.

Delta and star connections.

Polyphase motors; squirrel cage including across the line starting type (deep inductors), wound rotor, synchronous. Rotary converters.

Slip, rotor frequency, torque, speed.

Across the line and autotransformer starters.

Power factor measurement and correction.

Iron and copper losses, efficiency, magnetizing current.

Polyphase rectifiers.

Phase shift control of thyratrons.

Ignitrons.

Electronic motor controls.

Shop Practices

1. Connect an across the line starter with two pushbutton stations.

2. Connect autotransformer type starting compensator.

3. Connect wound rotor variable speed motor.

4. Check phase rotation, connect lamps and synchronize.
5. Do three phase winding and connection diagrams.
6. Connect three phase rectifier.
7. Connect phase shift thyratron control.
8. Connect ignitrons.
9. Connect electronic motor control.
10. School repair jobs.

UNIT THREE: HIGH FREQUENCY APPLICATIONS

Theory

Amplifiers class A, B, C, cathode follower, voltage gain, frequency response.

Amplification factor, AC plate resistance, mutual conductance, diodes, triodes, tetrodes, pentodes, beam power tubes, npn and pnp transistors.

Oscillators and multivibrators, Hartley, Colpitts, Armstrong, tuned-grid-tuned-plate, crystal, electron coupled, magnetron, klystron, Barkhausen and Kurtz, symmetrical and cathode coupled or Eccles Jordan flip flop multivibrators.

Modulators, Heising, class B, grid, reactance, four diode lattice.

Spectrum of carrier and sidebands for AM and FM, pre-emphasis, modulation indicators.

Demodulators, rectifier, grid leak, Foster-Seeley discriminator, ratio detector.

Transmission lines and aerials, shorted, open, quarter and half wave.

TR and ATR tubes, characteristic impedance termination, standing wave ratio, matching stubs, impedance transformer, matching by series or parallel tuning, link coupling, dipole, folded dipole, director, reflector.

TV (Color).

Radar.

Shop Practice

1. Locate break in cable by capacity and grid dip meter.
2. Plot resonance curve.
3. Adjust wave trap or peaking circuit.
4. Adjust horizontal and vertical sync and linearity controls, focus magnet, centering controls and ion trap in TV receiver.
5. Operate radar.
6. Kit assembly.

SHOP DRAFTING FOR ELECTRICITY 30

Follow third year outline as noted in bulletin Special Shop Drafting Outlines.

and/or

Stress practical applications in developing circuit diagrams and reading prints.

BIBLIOGRAPHY

BIOGRAPHIES:

Particularly suitable for Electricity 10, but interesting and informative for all electrical students.

Dunlop, O.E: RADIO'S HUNDRED MEN OF SCIENCE. New York. Harper and Brothers.

Hammond, O.E: MEN AND VOLTS. New York. J.B. Lippincott.

Meadowcraft, W.H: THE BOY'S LIFE OF EDISON. New York. Harper and Brothers.

O'Neiel, John J: PRODIGAL GENIUS: THE LIFE OF NIKOLA TESLA. New York. Ives Washburn, Inc.

Stevenson, O.J: THE TALKING WIRE: THE STORY OF ALEXANDER GRAHAM BELL. Julian Messner, Inc.

REFERENCE BOOKS:

Annett, F.A: PRACTICAL INDUSTRIAL ELECTRONICS. McGraw - Hill Publishing Company.

Braymer: ARMATURE WINDING AND MOTOR REPAIR. 1920 McGraw - Hill Publishing Company.

Braymer and Roe: REWINDING SMALL MOTORS. 1949. McGraw-Hill Publishing Company.

Carleton, Robert H: VITALIZED FUNDAMENTALS OF ELECTRICITY. New York. College Entrance Book Company.

Chirardi, Alfred: RADIO PHYSICS COURSE. Radio Technical Publishing Company.

Craft, Terrel: AMERICAN ELECTRICIAN'S HANDBOOK. 1953. John Wiley and Sons, Ltd.

Crow, Leonard R: LEARNING ELECTRICITY AND ELECTRONICS EXPERIMENTALLY. Scientific Book Publishing Company.

Dawes, Chester, L: INDUSTRIAL ELECTRICITY, PART I, PART II. McGraw - Hill Company.

Dudley: CONNECTING INDUCTION MOTORS. 1936. McGraw - Hill Publishing Company.

Dudley: AC MOTOR WINDING. McGraw - Hill Publishing Company.

Fowler and Lippert: TELEVISION FUNDAMENTALS. McGraw - Hill Publishing Company.

Gibbs: TRANSFORMER PRINCIPLES AND PRACTICE. McGraw - Hill Publishing Company.

Grob, Bernard: BASIC TELEVISION PRINCIPLES AND SERVICING. McGraw Hill Company.

Hausman, Enrich: SWOOPE'S LESSONS IN PRACTICAL ELECTRICITY. D. Van Nostrand Company.

Henney, K: RADIO ENGINEERING HANDBOOK. McGraw-Hill Company.

Hellman, Charles, I: ELEMENTS OF RADIO. D. Van Nostrand Company.

Henney and Fahnstock: ELECTRON TUBES IN INDUSTRY. 1952. McGraw - Hill Company.

Kiber, Milton S: TELEVISION AND F.M. RECEIVER SERVICING. D. Van Nostrand Company.

Lehman: SHOP PROJECTS IN ELECTRICITY.

Lister: ELECTRICAL CIRCUITS AND MACHINES.

Marcus and Levy: ELEMENTS OF RADIO SERVICING. 1947. McGraw - Hill Company.

Nadon and Gelmine: INDUSTRIAL ELECTRICITY. 1951. D. Van Nostrand Company.

Richter: WIRING SIMPLIFIED. Park Publishing Company (available through T. Eatons).

Stafford: TROUBLES OF ELECTRICAL EQUIPMENT. 1947. McGraw - Hill Company.

Stokley, J: ELECTRONS IN ACTION. McGraw - Hill Company.

Timbie, W.H; ELEMENTS OF ELECTRICITY. 1952. McGraw - Hill Company.

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